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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/360,292	07/22/1999	SUJIT SHARAN	MI22-1106	3962

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WELLS ST. JOHN P.S.
601 W. FIRST
SUITE 1300
SPOKANE, WA 99201-3828

EXAMINER
AHMED, SHAMIM

ART UNIT	PAPER NUMBER
1746	

DATE MAILED: 01/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

T-D-6

Office Action Summary	Application No.	Applicant(s)	
	09/360,292	SHARAN ET AL.	
	Examiner	Art Unit	
	Shamim Ahmed	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 January 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-24 and 35-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-24 and 35-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2&5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed 1/04/02 contains a reference (09/696,899), which also appears on the IDS submitted on 4/27/01. So, one of the reference is crossed-out from the PTO 1449.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 15-24 and 35-41 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not disclose how the masking layer is removed from the substrate (see page 8, lines 3-4). So, the specification is not enabling for the removing step of the masking layer from the substrate.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 35 and 39-41 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhao et al (6,204,192).

Zhao et al disclose a plasma cleaning process for openings formed in at least one insulation layer over a substrate, wherein photoresist mask is removed after the formation of openings using a plasma etching process containing carbon-containing gases (col.4, lines 17-36). Zhao et al also disclose that after removal of the resist mask layer, the etch residues (38) on the openings are removed by using a plasma containing hydrogen or hydrogen-containing gas such as ammonia (NH_3) and the removal process is done prior to a subsequent depositing any material over the substrate (col.4, lines 40-47, col.4, lines 66-col.5, lines 22, figures 2-3).

6. Claims 15-20,22-24, 35-36,38-41 are rejected under 35 U.S.C. 102(e) as being anticipated by Smith (6,277,733).

Smith discloses a plasma process for removing residual polymer material, which is deposited from a previous etching process. Smith teaches that after forming an opening over a substrate using a photoresist mask that can be removed by using a plasma process followed by a clean-up step (col.3, lines 32-38, figure 1).

As to claims 15-16, 35 and 38, Smith teaches the plasma can be an oxygen ash step followed by a clean-up step (col.3, lines 36-38). As to claims 17-20, and 39-41, Smith teaches that hydrogen plasma is preferably used to remove the photoresist any residue, wherein the hydrogen plasma contains other hydrogen containing gases such as NH_3 (col.3, lines 39-47). Smiths also teach that the temperature of the substrate is maintained around 100-400 degree C during the clean-up process. As to claim 23, Smiths teaches that a subsequent clean-up step (313) is performed after the first clean-up step (312) prior to a deposition step (col. 4, lines 8-41).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 21 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith as applied to claims 15 and 35 above, and further in view of Taguwa (6,020,254).

Smith discussed above in paragraph No.6 but fails to teach the processing temperature Can be maintained at least 600 degree C. However, Taguwa teaches a plasma etching Process, wherein the substrate temperature is maintained at about 600 degree C for etching residues from the openings or contact hole, which is formed by a conventional lithography and dry etching (col.5, lines 25-53). Therefore, it would have been obvious

to one skill I the art at the time of claimed invention to combine Taguwa's teaching into Smith's method for effective removal of the etching residues including damaged layer and a native oxide film from the surface of the contact region as taught by Tagawa.

9. Claims 15-16,21-22,35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Donohoe et al (6,093,655) in view of Egashira (5,902,134). Donohoe et al disclose a plasma etching process, wherein patterning a masking layer to form openings and performed a first etching process to etch the insulation layer through the openings and then performs a plasma etch to remove some of the mask layer along with polymer residue (col.4, lines 65-68). Donohoe et al also disclose that another cleaning is conducted to remove all the remaining polymer material from the contact opening and also to remove remaining photoresist (col.5, lines 5-8). Donohoe et al remain silent about the process temperature could be at least 400 and at least 600 degree C. However, Egashira teaches that the temperature of the process can be maintained at 100 degree C or lower and the temperature can be increased upto 250 degree C to remove photoresist to accelerate the removing or ashing speed, thereby enabling the ashing time to be shortened (col.5, lines 36 – 60 and col.6, lines 43-47). So, it would have been obvious to one skill in the art to optimize the temperature, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one skill in the art at the time of claimed invention to combine Egashira's teaching into Donohoe et al's method to increase the

Process temperature upto at least 400 and 600 degree C for accelerating the speed of the process and thereby decreasing the process time as taught by Egashira.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ye et al (6,153,530) disclose a post-etch treatment of a plasma-etched surface to prevent corrosion; Stinnett (6,325,861) disclose a method for etching and cleaning a substrate, wherein a second cleaning step is performed for removing remnant resist material after the first cleaning step.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-305-7718 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

SA
January 26, 2002

FRANKIE L. STINSON
PRIMARY EXAMINER
GROUP ~~3400~~ 1700